tomologist and technical officer assigned to the Caribbean. During the 1981 dengue activity this staff was coordinated by a task force of a virologist, epidemiologist and entomologist at the PAHO headquarters in Washington. At present there are 8 professional entomologists in PAHO: 1 in Haiti (malaria), 1 in Mexico (malaria), 1 in Brazil (malaria), 1 in Venezuela (Chagas' disease), 2 in Colombia (*Ae. aegypti*), 1 in Trinidad (*Ae. aegypti*), and 1 in Washington (vector control).

The majority of PAHO consultants on vectors collaborate on *Aedes aegypti, Anopheles* or *Triatoma* related problems, However, they are occasionally asked to evaluate urban vector-pest control activities, pesticide usage and toxicology, rodent biology and control, and in the Caribbean pest mosquito and sand fly problems.

There are limited funds to purchase insecticides and equipment for emergencies and frequently the Organization assists countries in making purchases using national funds.

Latin America has serious vector problems including: 1) over 500,000 cases of malaria per year, 2) over 500,000 cases of dengue in 1981, 3) about 20,000,000 cases of Chagas' disease and 4) cases of leishmaniasis, filariasis, onchocerciasis, plague, other arbovirus diseases, typhus, schistosomiasis and others which may become increasingly important.

Solutions are not easy. Many of these diseases only affect the rural inhabitants and the poor. Economics direct attention to the maintenance of a healthy worker in an industrial complex and not to the poor or the agricultural worker. The urban population has the political power and in most cases the wealth. Medical entomologists, even if available, probably would have little influence in changing the above. But their accumulative effort might make life a little healthier for those in vector-borne endemic areas.

THE UNITED STATES INVOLVEMENT IN OVERSEAS MALARIA PROGRAMS

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Historically speaking, the United States' interest in malaria overseas could be said to have begun with the building of the Panama Canal. Then in the late 1930's came the first foreign assistance to malaria programs through the Institute for Inter-American Affairs which earmarked some several million dollars, specifically for the control of malaria. In the 1940's the Rockefeller Foundation was extremely active and successful in demonstrations of malaria control in various places, but notably in Brazil, where they eradicated the introduced vector of malaria, *Anopheles gambiae*. Later they attempted to eradicate the vector in Sardinia. Although this attempt was not successful in eradicating the mosquito, it certainly led the way for eradication of malaria in many places with methods which have been used ever since. By the late 1940's and the early 1950's the United

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States Government through its foreign aid program was giving direct bilateral assistance to a number of countries for their malaria programs.

This world-wide program peaked in the mid-1960's with U.S. foreign aid programs providing some 70 malaria advisors overseas and an average of about 50 million dollars a year to 37 countries. From 1950 to the present, AID (Agency for International Development) and its predecessor agencies contributed close to one billion dollars in the support of overseas malaria programs. Nearly 700 million of it went to some 36 countries in direct bilateral agreements and to the multilateral agencies, such as World Health Organization, Pan American Health Organization, United Nations International Childrens' Emergency Fund, and the United Nations Development Program. These agencies then distributed funds to some 90 countries, including nearly all of the countries of the world with malaria programs. By the late 1960's assistance by AID was substantially reduced. This was in part, because of the highly successful malaria programs which had drastically reduced malaria throughout a large part of the country to where it was no longer considered a serious public health problem, but also because of AID budget reductions which resulted in money going to other priority programs. In a number of countries where AID assistance was terminated, the countries themselves then diverted their funds to other programs. Consequently, within a period of 3 to 5 years, malaria had returned to the point where again a crash program was required and AID assistance was resumed in order to protect other development programs. The current status of U.S. assistance to overseas malaria programs can be summed up rather briefly. The Agency for International Development is currently involved in assistance to malaria programs in Indonesia, Thailand, Nepal, India, and Sri Lanka. In Africa a demonstration project is just being completed in Zaire and a new control project is starting in Zanzibar. In the Americas, AID is assisting the program in Haiti, and also in Honduras where malaria control is a part of the health sector assistance program.

OTHER U.S. AGENCIES

The CDC (Centers for Disease Control) have personnel involved in malaria research and training in Guatemala, in Haiti, in Kenya, in Zaire, and in Malaysia. Personnel from The National Institutes of Health are monitoring malaria research in Egypt.

The U.S. Army has personnel conducting malaria research in Thailand with the Armed Forces Research Institute of Medical Sciences and also in Brazil.

The U.S. Navy has personnel involved in research on malaria in the Philippines and Indonesia.

THE NEED FOR CONTINUED U.S. EXPERTISE

In view of the current situation in which control of malaria, through the use of residual insecticides and antimalarial drugs, is becoming more difficult every year with additional species of mosquitoes becoming resistant to insecticides and with drug resistant malaria spreading, comprehensive vector control using all available methods in an integrated approach is becoming more important. In some countries, vector control is the only hope for reducing the amount of malaria. Although the need to make use of all available methods of malaria control has been recognized for a number of years, still very few countries are actually conducting programs in which they are making proper use of a variety of vector-control methods, such as source reduction, larviciding, space spraying and biological control. Although some countries have committed themselves to such a program, many of them are still not using these methods or are using them improperly. The reason is easy to see. Most of the senior personnel directing malaria pro-

grams throughout the world were trained in one or another of the malaria eradication training centers, where they learned residual spraying and drug treatment. Although they were exposed to the fact that there are other methods, they really did not learn how to use them. It is for this reason that WHO, PAHO, and AID have concerned themselves in recent years with the need for training in the field of malaria that would emphasize the use of all available methods. As a result of this concern, there has now been established in Kuala Lumpur, Malaysia a WHO training secretariat on malaria and other vector-borne diseases, which is attempting to coordinate and assist national training programs with this conversion to the use of all available methods of malaria control. Also, the Pan American Health Organization has already sent fact-finding teams to the Latin American countries to determine the training needs in the field of malaria and vector-borne diseases and survey the resources available for meeting those needs. A seminar will be conducted by PAHO during September 1982 directed towards developing a training plan for the Americas in this field of malaria and vector-borne diseases.

Through the local mosquito control programs the state health departments, the universities, and through federal agencies, the U.S. has a favored position in this matter of expertise on various methods of vector control. There are many experts who are in a good position to provide the developing countries with the kind of information they need to make better use of the available methods of vector control that are already in use throughout the U.S. Fortunately at the present time, there is considerable interest in this field. The Agency for International Development has recently (April 13–16, 1982) sponsored a workshop on Comprehensive Vector Control through the U.S. Department of Agriculture's laboratory in Gainesville, Florida in which priorities were established for research to improve current methods or develop new methods of vector control. The National Academy of Sciences, also with AID funding, is planning a workshop on training requirements and career opportunities in vector biology and control.

However, in spite of the obvious need and the apparent interest in doing something about improving vector control activities, there appears to be no plan, no mechanism, by which the U.S. expertise can be put to work on behalf of developing countries. The AID for some years now has been in the position of being asked to do more with less. At the peak of the antimalaria effort in the mid-1960's, AID provided 70 malaria experts in the field and annually expended between 50 and 100 million dollars in support of antimalaria programs. This agency is now reduced to the level of exactly 2 malaria advisors (one in Washington and one in the field) plus 5 country malaria project-monitors in the field on contract. The World Health Organization also, due in part to budget constraints, but also as a matter of policy, has reduced its malaria advisors from the peak number of several hundred down to less than 100. Theoretically, this should not make any difference. After all, over the past thirty years, both AID and WHO have sponsored hundreds, of training fellowships for senior personnel in national malaria programs. Unfortunately, these people are not necessarily still available. Many of them have moved on to senior positions of responsibility in their Ministries of Health and have been replaced by junior individuals, who have not had adequate training. An adequate senior malariologist professional course has not been available on a regular basis since 1973 when the National Eradication Training Center in Manila was closed.

There are 3 priority areas of need in the worldwide malaria program today. First, and most important, is the job-oriented training of the senior personnel from malaria and other vector-borne disease programs. Good progress is being made in meeting this need through the training secretariat in Kuala Lumpur,

Malaysia established by WHO with assistance from AID and CDC, through the integrated control course in Turkey referred to by Mr. Rafatjah in another presentation, through the malariology course organized by WHO in Rome, Palermo and Turkey and through the plans underway by PAHO for development of a training program in malaria and other vector-borne diseases for the Americas.

There is considerable scope for a contribution of U.S. expertise to this program. Individual specialists will be needed for preparation of training aids and for actual teaching. Another way in which U.S. expertise can serve this training program, is through individual or traveling seminar types of observation tours, usually sponsored by WHO or AID. I am sure that many of you have had foreign visitors or groups of visitors come to see your programs. This has all too often been on an ad hoc, last minute, hit or miss basis. The American Mosquito Control Association is in an excellent position to assist this effort by surveying its members for their interest in hosting such visits and coordinating such observation tours of vector control and research activities in the field of an organized basis.

The second area of need is for the provision of specialists to work overseas with malaria or vector-borne disease programs on a regular basis, 2 or more years, or for short term assignments of 2 weeks to 2 months, to evaluate on-going programs or to assist in developing plans for new programs. The supply of malariologists, medical entomologists, or engineers with actual field experience in malaria or vector control programs has dwindled to the vanishing point. World War II, MCWA (Malaria Control in War Areas), or even AID "retreads" are just no longer available in reliable numbers. For those fresh out of school who are interested, we are back in the situation where you cannot obtain a job because you do not have experience and you cannot get experience because you cannot get a job. The administrator of AID, Mr. Peter McPherson, has recently made an imaginative and innovative proposal, which if implemented, could go a long way towards solving this problem. In an address to the National Association of State Universities and Land Grant Colleges on November 10, 1981, he proposed that AID and Universities work together to establish a core of jointly utilized AID/University, career professionals, who would remain employees of the University, but AID would reimburse the University for costs associated with their assignment with AID. On completing an overseas tour for AID, they would then be in a reserve status and would be available and on call for short-term assignments at AID expense. When and if this proposal is acted upon, it could make a start towards a solution of this problem. Similar proposals have been made in the past but have never gone beyond the talking stage. In the meantime, AID and WHO find that in order to field teams with knowledge and experience, they must drag "old duffers" like myself out of retirement. The average age of a 5 person malaria team, that followed the road to Zanzibar for AID 2 years ago, was 65.

The third area of need is in the field of research. In order to convert malaria eradication programs to malaria control programs, utilizing all available methods in an integrated approach, the individual countries are finding that they must organize and conduct applied field research projects in which they test each of the supplementary or alternative methods against each of their vector species. Many of the developing countries need advice, training, and assistance in developing such a research program. In general, the trend in recent years has been for the funding agencies to provide the money directly to the developing country institutions. It is then up to them to make their own arrangements for external technical assistance and/or collaboration. Here again is an area where U.S. experience could be used to good advantage on behalf of the developing countries. However, there is a need for a central clearing house of information as to the availability

of specialized expertise in the field of vector-borne disease research. Again the American Mosquito Control Association could serve a very useful purpose by organizing and coordinaging such an effort, which would be a logical outgrowth of the Directory of Vector Control Specialists recently developed (1982) by Eugene Gerberg and the AMCA World Wide Committee.

PROSPECTS FOR THE FUTURE

The prospect for any expansion of U.S. involvement in malaria programs in the future does not appear very bright at the present time. The trend for some years in AID financing of malaria programs has been towards multi-donor funding, with 2 or more donor countries sharing costs of funding of malaria as a part of a primary health care program. I would predict that these trends will continue.

During the past several years, malaria programs have been funded by the World Bank, by UNDP, by the United Kingdom, by The Netherlands, by Japan, and by the Scandinavian countries.

There is some prospect of renewed interest by AID which might lead to a greater involvement in malaria programs. The GAO (General Accounting Office) has recently issued (1982) an audit report on world-wide malaria programs in which they call attention to the increasing seriousness of the malaria problem worldwide, and recommend to the AID that they reexamine their strategy for control of malaria. I am sure we will all follow the results of that recommendation with a great deal of interest.

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